

AMENDMENTS TO THE DRAWINGS

Figure 1 is amended in accordance with the replacement sheet attached to this paper. As requested by the Examiner, reference numerals have been added for items 120 and 122.

AMENDMENTS TO THE SPECIFICATION

Please AMEND the following paragraphs in the specification as follows, where each numbered paragraph below corresponds to the like-numbered paragraph in the specification:

[0017] Figure 7 is a cross-sectional view of trocar 100 shown in Figure 1, ~~taken along line 7-7 and~~ having the obturator 110 removed for clarity.

[0019] Figure 9 is a perspective view of an alternative embodiment of a gasket retainer ring made in accordance with the present invention. ~~Figure 6 is a perspective view of seal 5, attached to a flotation system 80 having an instrument 90 inserted therethrough.~~

[0024] Gasket ring 8 ~~Gasket ring 20~~, shown in Figure 4, helps in securing seal segments 4a-4d onto retainer ring 8. Gasket ring 20 can be made of any number of materials known to those skilled in the art including, but not limited to, polycarbonate. Gasket ring 20, has top 22, bottom 24, and opening 23 therethrough. Gasket ring 20 further includes a plurality of gasket pin holes (not shown) disposed therein on bottom 24 for receiving retainer pins 10 and a plurality of crown holes 28 therein on top 22 for receiving crown pins 32. Gasket ring 20 further includes a plurality of gasket pins 29 extending from bottom 24.

[0027] When assembled as seal assembly 2, the protectors are layered together as described above, and the seal segments are layered together as described below. As is better seen by referring to figure 3, gasket pins 10 go through holes 6 in seal segments 4, and snap into gasket pin holes 28 ~~gasket pin holes 26~~, and gasket pins 29 snap into holes 14 on retainer ring 8 to secure gasket ring 20 to gasket retainer ring 8 together, with the seal segments disposed therebetween. Crown pins 32 go through holes 42 on protectors 40 and snap into crown holes 28 to help secure gasket ring 20 to crown 30 with protectors 40 disposed therebetween. When all assembled, it forms seal assembly 2 (shown in Figure 6).

[0028] Seal protectors 40 are well known in the art and are described in U.S. Patent 5,308,336 issued to Hart et al. on May 3, 1994, which is hereby incorporated herein by reference.

As illustrated in Figures 2-6, retainer ring assembly 3 includes four seal segments 4a-4d, gasket retainer ring 8, and gasket ring 20. Any number of seal segments can be used and the invention herein is not limited by four. Each seal segment 4a-4d, which can be made of but is not limited to an elastomer such as, for example, silicon, can be molded flat or non-planar~~flat or non-planar~~.

[0030] Alternatively, one can use only four pins for~~pins are for~~ positive fixation through the gasket holes (6). The four pins can be located on the~~located the~~ gasket ring 20 and four corresponding holes can be located on the gasket retainer ring. The seal segments (4a-d) have holes only corresponding to these locations. To supplement the fixation associated with these pin-hole combinations, additional “pinch-pins” can be located on both the gasket ring 20 and the gasket retainer ring 8. These pinch-pins are conical-shaped protrusions projecting from both the distal surface 24 of the gasket ring 20 and the proximal surface 11 of the gasket retainer ring 8. These conical protrusions on each part radially align with one another, and compress the perimeter flange of the seal segments when the gasket ring 20 and gasket retainer ring 8 are assembled together. Due to the sharpness of the tip on the conical protrusions, they “dig in” to the flexible material of the seal segments, aiding in fixation of the perimeter of the seal segments.

[0033] The above described embodiment of placing seal segments 4a-4d onto retainer pins 10, allows seal segments 4a – 4b to form a seal 5 having a conical shape as shown in Figures 3 and 5. Figure 4 shows~~Figure 5 shows~~ seal 45 as having a hole 74 at its distal end. However, seal segments 4 could be configured so as not to have a hole therethrough so as to form a zero closure valve. In addition, the seal segments themselves can be molded such that they have a varying thickness across the profile of the seal. This can be done for several reasons i.e. minimizing leak rate, drag, and is also described in the above incorporated reference Serial No. 60/506,730 [Attorney Docket No. END 5168] titled REINFORCED SEAL ASSEMBLY, filed on September 30, 2003.

[0036] In addition, because the described embodiment reduces strain, it is possible to make the hole at the center of the seal smaller than is typically desired for lip seals. Forces associated with instrument use in lip seal designs are greatly affected by reductions in the size of the hole. While there is some impact with the segmented seal design of this patent, the effect is

much less dramatic. Therefore, by reducing the hole-size at the center, the segmented seal can gain an improved ability to maintain insulflation when a small instrument is axially offset to one side of the trocar channel with a very minimal effect on instrument usage forces. Alternatively, the seal can be put together such that there is no hole ~~present providing a present provides a zero-~~closure design, sealing both when no instrument is present and while an instrument is present.

[0038] Figure 8 shows an alternative embodiment to gasket ring 20, gasket ring 120. Gasket ring 120 is very similar to gasket ring 20. However, gasket ring 120 has a plurality of protrusions 200 extending from its bottom or distal surface 124. Preferably protrusions 200 are conical shaped. Similarly, Figure 9 shows an alternative embodiment to gasket retainer ring, gasket retainer ring 108. Gasket retainer ring 108 is very similar to gasket retainer ring 8. However, gasket retainer ring 108 has a plurality of ~~protrusions 202~~ protrusions 302 extending from its top or ~~proximal surface 211~~ proximal surface 111. Preferably protrusions 302 are conical shaped. These conical protrusions, or “pinch-pins”, can be located on both the gasket ring 120 and the gasket retainer ring 108, or on just one of them. When on both 108 and 120, these conical shaped protrusions radially align with one another, and compress the perimeter flange of the seal segments when the gasket ring 20 and gasket retainer ring 8 are assembled together. Due to the sharpness of the tip on the conical protrusions, they “dig in” to the flexible material of the seal segments, aiding in fixation of the perimeter of the seal segments.

Please ADD the following paragraphs in the specification that we incorrectly deleted in the preliminary amendment, where each numbered paragraph below corresponds to the like-numbered paragraph in the specification.

[0002] Field of the Invention

[0018] Figure 8 is a perspective view of an alternative embodiment of a gasket ring made in accordance with the present invention.